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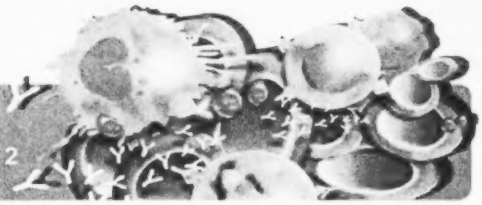

In this issue

Message from the Scientific Director

On behalf of the Institute of Infection and Immunity (III), I am pleased to welcome Dr. Alain Beaudet as the new President of CIHR and Dr. Christopher Power as the new Chair of our Institute Advisory Board (IAB). I would also like to welcome four new IAB members, who will bring new energy and vision to address the challenges faced by our health research community, and to thank our retiring members for their service to CIHR.

Since the creation of III in 2001, the challenges and opportunities for our research community have continued unabated. The Institute has provided leadership to address research issues such as HIV, SARS, pandemic influenza, and food and water borne infections, including BSE. We have engaged our research community in issues of global significance such as emerging infections, antibiotic resistance, new vaccines, immunotherapy, transplantation, autoimmunity and the human microbiome.

The Institute's commitment to HIV research is addressed through our CIHR HIV/AIDS Research Advisory Committee (CHARAC), chaired by Dr. Michael Grant. We are working closely with our partners to implement the Canadian HIV Vaccine Initiative (CHVI). There is much ongoing debate about this issue but new ideas and funding will move the research forward.

Our challenges continue as the summer of 2008 brought a Salmonella outbreak in the US and the Listeria outbreak in Canada took centre stage in the public health arena. Food safety is an issue that touches the minds and lives of virtually everyone and several years ago, III formed the 15-member Canadian Research Coalition for Safe Food and Water, that funded $13 million in research projects. These projects resulted in a number of research advances as outlined in our previous newsletters. Our commitment to research in microbial safety of food and water continues as demonstrated by our recent call for Catalyst grants in Safe Food and Water in Northern Communities.

The Institute is working with our partners in the Public Health Agency of Canada (PHAC) and the Canadian Food Inspection Agency (CFIA) to hold the first Canadian Pandemic Preparedness Meeting later in the fall to highlight the outcomes of funding provided under this joint initiative. I thank the Pandemic Influenza task group, headed by Dr. Mark Loeb from our IAB, for making this initiative a success.

In addition, health-care associated infections pose a major health challenge in terms of increased morbidity and mortality and also economic cost to the health-care system. Our funding in this area has provided important results with knowledge translation potential, as outlined in this newsletter.

Bhagirath Singh, PhD
Scientific Director
CIHR Institute of Infection and Immunity

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Canadian Institutes of Health Research / Instituts de recherche en santé du Canada
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Comings and Goings

New President - Dr. Alain Beaudet

In July 2008, CIHR welcomed a new President, ***Dr. Alain Beaudet***. Prior to joining CIHR, Dr. Beaudet was the President and Chief Executive Officer of the Fonds de la recherche en santé du Québec (FRSQ). Dr. Beaudet obtained a medical degree and a PhD in neuroscience from the Université de Montréal and completed his post-doctoral training at the Centre d'études nucléaires in Saclay, France and the University of Zurich's Brain Research Institute in Switzerland. Among his many accomplishments, Dr. Beaudet built a distinguished career at the world-renowned Montreal Neurological Institute (MNI) and has been the recipient of many grants, awards and distinctions. We look forward to working under the leadership of Dr. Beaudet in the coming years.

New and Retiring IAB Members

III would like to welcome the following members to its Advisory Board:

Dr. Peter Ernst is a Professor of Medicine at the University of Virginia, Charlottesville, VA. His research interests include gastrointestinal inflammation, specifically lymphoepithelial cell interactions in *H. pylori* infections and inflammatory bowel disease. The ultimate goal of Dr. Ernst's research is to enhance the design of immunotherapies for the treatment or prevention of chronic gastrointestinal inflammation.

Dr. Vivian Loo is the Chief of the Department of Microbiology at the McGill University Health Centre in Montreal, Quebec, and an associate professor of medicine at McGill University. Dr. Loo's research interests include antimicrobial resistance and hospital epidemiology. In the last five years, her research has concentrated on the clinical and molecular epidemiology of *C. difficile*. She is a member of the Quebec provincial *C. difficile* surveillance committee and was an author on the Quebec provincial guidelines for the control of *C. difficile*.

Dr. Steven Jones is the Head of the Immunopathology Unit of the Special Pathogens Program at the National Microbiology Laboratory, Canadian Science Centre for Human and Animal Health, where he leads the Public Health Agency of Canada's microbiological emergency response teams. Dr. Jones also holds an adjunct professor position in the Department of Immunology at the University of Manitoba. Dr. Jones' research interests include the design of immunotherapeutics and vaccines for Ebola, Marburg and Lassa hemorrhagic fever, viruses and the immunopathology of Viral Hemorrhagic Fever (VHF) diseases.

Dr. Robert Hogg has established a national and international reputation in population health research with an emphasis on HIV/AIDS, antiretroviral therapy, and marginalized populations. He is currently a Professor in the Faculty of Health Sciences at Simon Fraser University in Burnaby, British Columbia and the Director of the HIV/AIDS Drug Treatment Program at the BC Centre for Excellence in HIV/AIDS in Vancouver, as well as an adjunct Professor in the Department of International Health and Cross-Cultural Medicine at the University of California, San Diego.

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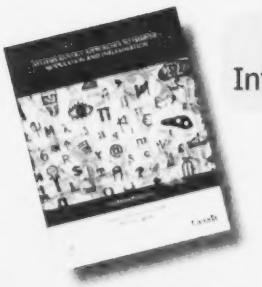
The Institute would like to extend its thanks to the following retiring IAB members: The IAB inaugural Chair, **Dr. Lorne Babiuk**, and IAB members **Drs. Warren Hill**, **Allison McGeer** and **Noel Rose**. Their hard work, commitment and dedication during their time with the IAB has been greatly appreciated and valued. **Dr. Christopher Power** has taken over the role of Chair for the III Advisory Board; congratulations Dr. Power!

Membership of the CIHR HIV/AIDS Research Advisory Committee (CHARAC)

Last October, Dr. Christopher Power from the University of Alberta stepped down as the Chair of CHARAC; Dr. Michael Grant of Memorial University was named as his replacement. We are also pleased to welcome Dr. Marina Klein of McGill University who has agreed to serve a two year term on the committee, following a successful call for nominations. Stay tuned in the upcoming months for another call for nominations posted to the Institute HIV/AIDS website. For information on the CHARAC nomination process please contact Susan Lalumiere (susan.lalumiere@cihr-irsc.gc.ca or 613-952-4263).

III Reports



Systems Biology Approaches to Immune Modulation and Inflammation - Report from the January 22-23, 2008 Workshop

III hosted a one and a half day workshop in Montreal to explore the potential for applying a systems biology approach to the study of immunotherapy, inflammation and immune-based diseases. The workshop report is available at: http://www.cihr-irsc.gc.ca/e/35999.html

A Canada/UK Workshop: "Beating the Bugs" - Report from the February 6-7, 2008 Workshop

III organized a workshop, hosted by the Canadian High Commission in London, UK, to bring together the leading researchers in the field of antibiotic resistance from both the UK and Canada to explore opportunities for partnerships. The workshop report can be found at: http://www.cihr-irsc.gc.ca/e/36612.html

Canadian Microbiome Initiative (CMI) - Report from the June 16-17, 2008 Workshop

III, in partnership with Genome Canada, hosted an invitational workshop to plan for Canada's role in the Human Microbiome Project. The workshop involved over 60 researchers and representatives from partner organizations and provided networking opportunities in addition to an overview of current national and international research in the field. Participants were asked to combine their knowledge and expertise to provide recommendations to III and partners on the best way to move the initiative forward. The workshop report will be posted on the III website in the coming weeks.

III Reports - continued

CIHR HIV/AIDS Research Initiative Strategic Plan 2008-2013

The CIHR HIV/AIDS Research Initiative Strategic Plan was approved at the May 2008 Institute Advisory Board meeting. The document defines the Initiative's goals and objectives and positions Canada's strategic HIV/AIDS research priorities in the context of an overarching strategic plan that will serve as a useful guide for CIHR HIV/AIDS Research Initiative investments over the next five years. The Strategic Plan will be posted on the Initiative's website in the coming months. For further information, please contact Andrew Matejcic (andrew.matejcic@cihr-irsc.gc.ca or 613-941-4483).

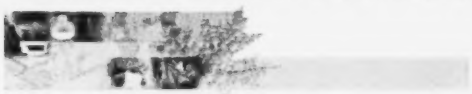
Vaccines for the 21st Century

III has made Vaccines of the 21st Century a research priority. In order to inform the development of a strategic plan, the Institute surveyed researchers and representatives from vaccine-related organizations. Survey respondents outlined Canadian accomplishments in the area of vaccine research and identified challenges and made suggestions on how CIHR and partners can facilitate vaccine research and development. The report highlights are available on the Institute website at: http://www.cihr.gc.ca/e/36756.html and the full report will be posted in the coming months.

Centres for Population Health and Health Services Research Development in HIV/AIDS – Report from the March 17, 2008 Workshop

CIHR hosted a Team Development Workshop in Ottawa with over thirty individuals, including researchers with expertise in HIV/AIDS, knowledge users, and representatives from CIHR. The purpose of the workshop was to assist researchers in gaining an understanding of the application process and the key components of the application. The workshop also enabled researchers to meet one another and knowledge users, exchange information and discuss areas of interest with a view of preparing team applications. The workshop report can be found at: http://www.cihr-irsc.gc.ca/e/36399.html.

HIV: CBR Evaluation



Community-Based Research Evaluation – Consultation Process

Having completed its third full funding competition, CIHR is undertaking an evaluation of the HIV/AIDS Community-based Research (CBR) Program (http://www.cihr-irsc.gc.ca/e/36185.html). A dialogue session with CBR stakeholders is being planned for the winter of 2008 with the goal of sharing the information captured during a preliminary evaluation and seeking feedback on the future direction of the CBR program. Participants will be drawn from researchers (CIHR and non-CIHR funded), community leaders, community members and partner organizations. It is expected that the results of this consultation will ensure long-term relevance of the CBR program to the community most implicated by the research it undertakes.

For more information on the CBR Consultation Process, please contact Chaidwick Leneis (chaidwick.leneis@cihr-irsc.gc.ca or 613-948-9396).

Funding Opportunities

The CIHR Institute of Infection and Immunity is dedicated to supporting research and building research capacity in the areas of infection and immunity. For more information about the full list of current funding opportunities offered by III, visit the III home page (www.cihr.gc.ca/iii.html) and click on the "III Funding Opportunities" icon on the top right menu.

Emerging Team Grant: Co-morbidity of Brain Disorders and other Health Problems

The III CIHR HIV/AIDS Research Initiative is one of many funding partners on the CIHR Institute of Neurosciences, Mental Health and Addiction's Emerging Team Grant: Co-morbidity of Brain Disorders and other Health Problems. It is very common for individuals who become HIV infected to have, or become vulnerable to other diseases and disorders. This is in part due to the risk factors involved in the initial infection such as substance use, mental illness and homelessness as well as biological factors, particularly immunosuppression.

Accordingly, the HIV/AIDS Research Initiative will consider supporting research on the psychosocial aspects or biomedical-clinical aspects of psychiatric and neurological co-morbidities that are associated with HIV/AIDS. Please consult the CIHR funding database for more information on this opportunity.

Canadian HIV Vaccine Initiative

The Canadian HIV Vaccine Initiative (CHVI http://www.chvi-icvv.gc.ca/index-eng.html), a partnership between the Bill & Melinda Gates Foundation and five departments of the Government of Canada represents Canada's efforts to take leadership in the area of vaccine discovery and manufacturing. CIHR, in partnership with the Canadian International Development Agency (CIDA), is responsible for the Discovery and Social Research component of this initiative. Through this component, support will be provided to HIV vaccine discovery and social research while strengthening the capacity and promoting greater involvement and collaboration amongst researchers in Canada and low- and middle-income countries (LMIC). Together CIDA and CIHR are making efforts to maximize the potential for important scientific discoveries in the area of HIV vaccines.

Following discussions with a wide range of Canadian and international stakeholders, a series of funding opportunities aimed at addressing all stages of health research was outlined. Excellence in research by individuals and teams will be supported through the **Operating Grants** launched in June 2008 (http://www.chvi-icvv.gc.ca/og-eng.html). New and novel ideas for short term projects and planning initiatives with potential for significant impact will be supported through **Catalyst Grants** launched in August 2008. Support for HIV vaccine discovery and social research will include strengthening the capacity and promoting greater involvement and collaboration amongst researchers in Canada and LMIC. Later in 2008, **Large Team Grants** will be made available to established and experienced teams of Canadian and LMIC researchers. These grants are expected to strengthen links between Canadian and LMIC researchers and facilitate sharing of research data and knowledge.

For information on the research component of the CHVI, please contact Paula Kirton (paula.kirton@cihr-irsc.gc.ca or 613-952-3564).

Funding Decisions

The following funding decisions have been announced over the previous months. Consult the III website for full details: http://www.cihr-irsc.gc.ca/e/26644.html

August 2008

- Meetings, Planning and Dissemination Grant - Infection and Immunity

July 2008

- Strategic Training Initiative in Health Research (STIHR) approved letter of intent for next competition

June 2008

- Team Grant: Pandemic Preparedness - Influenza Biology, Vaccines, Ethics, Legal and Social Research

April 2008

- Meetings, Planning and Dissemination Grant - Infection and Immunity

...continued on page 6

- Operating Grants: Pandemic Preparedness Research - Influenza Diagnostics, Transmission, Ethics Review and Antivirals

March 2008

- Catalyst Grant. Pandemic Preparedness

February 2008

- Institute of Infection and Immunity (III) - HIV/AIDS Community-Based Research Program

January 2008

- Operating Grants - Priority Announcement: Infection and Immunity
- Institute of Infection and Immunity - HIV/AIDS
- Operating Grants Priority Announcement: Infection and Immunity - Pandemic Preparedness (Bridge Funding)

Health-Care-Associated Infections (HAI)

Selected Research Results and Outcomes

One of the strategic research areas described in III's 2007-2012 Strategic Plan is "Emerging Infections and Microbial Resistance: Solutions from innovation in tools and technologies." This priority builds on previous III initiatives addressing the impact of antibiotic resistance on human health, the most recent of which was the Novel Alternatives to Antibiotics initiative launched in 2006. III has also supported several projects focused on hospital-acquired infections, such as *C. difficile*, from both the biomedical and health services perspective. There are many interacting and overlapping factors involved in the increasing incidence and severity of HAI and community-related infections including: decreased levels of hospital cleanliness, poor adherence to hand hygiene practices, the changing demographics in health-care settings (e.g. increasing elderly), and the escalating acquisition of antibiotic resistance in both common and emerging pathogens. For methicillin-resistant *Staphylococcus aureus* (MRSA) alone there has been a 19-fold increase, over ten years, in the rate of MRSA detected at hospital admission and it has been estimated that currently one out of nine patients admitted to hospital each year will develop HAI and of these patients, 8,000 will die. This rise in hospital-acquired infections has resulted in increased wait times and lengthened hospital stays, as well as hospital wards and facilities closed due to isolation of infected patients. This in turn has translated into a significant increase in the cost to the health-care system, estimated to be as high as $1 billion annually, and has had a significant impact on public confidence in our health care institutions.

In 2007-2008, CIHR invested more than $10 million to support research related to antibiotic resistance and infection control, including HAI. The following five CIHR funded projects, of which some are supported through III's strategic research initiatives, are showing promising outcomes.

Geoffrey Fernie

Advanced hand hygiene system to reduce hospital-acquired infections

Hand washing is the most effective method for controlling the spread of infections, yet compliance of hospital staff with basic hand hygiene requirements is poor. Dr. Geoffrey Fernie and his team at the Toronto Rehabilitation Centre, are developing two complementary, innovative technologies to increase the control of hand washing in hospitals. The first is a hand hygiene unit that is placed at the entrance of facilities, special units and individual patient rooms and the second is an advanced wearable hand hygiene system that automatically reminds health-care workers to disinfect their hands as they move between patients. These tools provide health-care workers feedback on their hand hygiene performance and can provide hospital management with simple, powerful tools to monitor hand hygiene compliance and effectiveness. Dr. Fernie explained that "the process of transferring the system to commercial production has already begun with a new joint venture being assembled of companies with an interest in this field. This will allow the time between the availability of the results of the clinical trial and the product appearing in the market, with modifications if necessary, to be very short." Dr. Fernie continued by stating that "the technology developed appears likely to be very inexpensive and relatively simple to install and that the team is moving forward on an application to bring their project to clinical trials."

John Conly

Physical plant design and engineering controls to prevent nosocomial infections and antibiotic resistant organism colonization events - A prospective controlled trial

While poor hand washing practices are often singled out as a primary cause for the increase in HAI, the physical design and the construction/layout of the hospital environment can have just as great an impact on the acquisition and transmission of organisms causing infection. Dr. John Conly, and his team at the Department of Medicine at the University of Calgary, is currently investigating the effects that a new innovative physical plant design can have on preventing the spread of HAI. Their research project, funded in part by III through CIHR's Partnerships for Health System Improvement (PHSI) program, is comparing the infection rates in patients treated in the new medical ward at the Foothills Medical Centre in Calgary (called the "Medical Ward of the 21st Century") against patients treated in the older "1950s style" ward in the same hospital. In this prospective controlled trial, patients are randomly assigned into the old or new ward (depending on availability) and the research team monitors the rate of infection and colonization for the three common hospital infections (MRSA, VRE, and *C. difficile*). Since both patient groups receive the same level of care from the same hospital staff - same Internal Medicine staff and similar nursing staff, a difference in the spread of infection can be attributed to the physical plant design of where the patients are being treated. The main differences between the ward designs are that the older ward has up to five beds per room, small bathrooms and poor hand washing facilities compared to the new style ward that has one bed per room, larger bathrooms and adequate hand washing stations that are designed to be aligned with the flow of the workplace. By following the infection and colonization rates for marker organisms in both wards for over a period of two years, Dr. Conly hopes to be able to determine if the new facility has succeeded in reducing the number of HAI.

Dr. Conly is also working with anthropologists and sociologists to run a nested social science mixed methods study that is investigating whether or not the organizational structure and health care practices are influenced by the new physical plant design. Dr. Conly hopes that the results of his study will help health policy and hospital administrators realize that when it comes to the design of hospitals, you can "either pay now or pay later. If you cut corners in the design and construction of a hospital, you will pay more in the long run with extended hospital stays and increased cost of treating new infections" explains Dr. Conly. "It is like buying a good pair of cowboy boots; if you pay more upfront for a quality boot, it will last you forever." As a result of his research and his preliminary data, the new South Health Campus in Calgary has already modified their hospital design to incorporate the new suggestions and other hospital administrators have expressed interest in the final research results due out next year.

Michael Mulvey

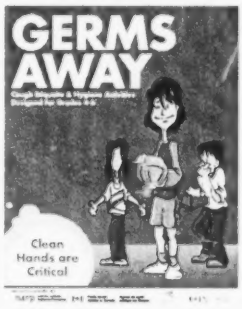
Community-acquired antimicrobial resistant bacteria in northern Canadian communities

Dr. Michael Mulvey, through his CIHR-III New Emerging Team Grant: *Community-acquired antimicrobial resistant bacteria in northern Canadian communities*, has led the development of the "Northern Antibiotic Resistance Partnership (NARP)," a collaboration between community members, health-care professionals, educators, research scientists, and the Public Health Agency of Canada. The NARP's primary focus is on antimicrobial resistant organisms in northern communities, where the factors influencing emergence and virulence can be very different from those in large urban centres. A three-pronged approach has been established to study the problem:

- Establishment of sentinel surveillance sites;
- Development of a case control study to identify the risk factors for community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA); and
- Development of educational programs for health-care professionals and the general public, including school programs.

Dr. Mulvey explained that "CA-MRSA infections, although appear to be often less virulent than health care-associated MRSA infections, are becoming an increasing community health issue in the north and that an understanding of the risk factors, and genetic information is essential for developing prevention and control strategies." Dr. Mulvey's team is currently working on sequencing the CA-MRSA genome in a number of isolates in the hopes of identifying the genes that make the organism so adaptable. In addition, the NARP has developed guidelines for the recognition and treatment of CA-MRSA and is providing access to these guidelines, along with surveillance tools such as questionnaires and databases, to the communities in need.

The NARP has adopted and developed a series of innovative tools and education programs for both health-care professionals and the general public, mostly targeting school-aged children. The Alberta Capital Health "*Do Bugs Need Drugs*" education program has been rolled out into the northern Saskatchewan communities. This program shows kindergarten children the difference between bacteria and viruses and when and how antibiotics are properly used. The program is offered in several languages and uses games, coloring sheets, songs and other forms of activities to communicate key messages. The NARP group has developed the "*Germs Away*" education program which targets children of grades four to six and focuses on proper hand washing and coughing etiquette. The program includes seven different activities accompanied by a training program for the teachers and to date has been distributed to 19 schools with a roll-out to Manitoba and Nunavut schools expected in the winter of 2008. Dr. Mulvey reported that "the next phase of the *Germs Away* program, which consists of a Flash animated game, is in the final stages of contract negotiation and should be ready for a general release in January 2009." The game will be made available through a link on the NARP website or on CD upon request.



Dr. Mulvey added that "the NARP will continue to support the expansion of its research objectives to other northern communities, and to explore additional educational tools to decrease the risk of transmission of MRSA in our communities." The education tools as well as additional information are available at no cost on the NARP's project website: http://www.narp.ca

Albert Berghuis

Structural biological studies of antibiotic resistance mechanisms

One of the major factors in hospital-acquired infections is the increase in antibiotic resistance. Dr. Albert Berghuis and his team at McGill University are using protein crystallography – the science of determining the arrangement of atoms within a protein from the manner in which a beam of X-rays is scattered from the electrons within the crystal – to understand the types of resistance mechanisms bacteria employ to evade and resist antibiotics. For example, certain bacteria produce enzymes that attack and break down antibiotics, such as amikacin and synercid. Dr. Berghuis is using crystal structures to track the movement of the atoms in these resistance causing enzymes while they attack the antibiotics. This information will help fight the resistance mechanisms in one of two ways; by developing inhibitors which will help prevent the enzymes from breaking down the antibiotic or by changing the structure of our existing antibiotics so that they are no longer susceptible to the bacteria's resistance mechanisms. The results of this research are currently being used in a clinical trial with a California-based company and there are promising results with an adjuvants that prevent the bacterial enzymes from attacking the antibiotics. Dr. Berghuis is optimistic about the future and says that "given that antibiotic resistant bacteria are not a new phenomenon, finding new methods for fighting resistance mechanisms could help buy us some time in the fight to control hospital-acquired infections."

Michel G. Bergeron

Molecular detection of sepsis-associated Gram-positive bacteria and antimicrobial resistance genotypes

The increasing rise in antibiotic resistance is caused, at least in part, by the misuse and overuse of antibiotics. Many patients are still being treated empirically because of the current slow culture-based methods for microbial identification which may take 48 hours or longer to provide a result. The consequence is often the unnecessary prescribing of antibiotics or administration of an inappropriate antibiotic. This could be prevented if rapid diagnostic tests were readily available.

Dr. Michel G. Bergeron and his team at the *Centre de recherche en infectiologie* of Université Laval, have developed several diagnostic tests that can identify bacteria directly from a clinical sample in less than one hour, providing a means to reduce the potential dissemination of infections such as meningitis, MRSA, vancomycin-resistant enterococcus and others. These tests are now being sold throughout the world and Dr. Bergeron reported that "a new rapid DNA-based test, for *C. difficile*, has recently been submitted to FDA and Health Canada for approval."

In 2006, Becton Dickson (BD) Diagnostic-GeneOhm took over the production and distribution of the products initially developed by Dr. Bergeron's laboratory and Infectio Diagnostic Inc. (IDI), a start-up company also created by Dr. Bergeron. In August 2008, BD announced the construction of the BD Research Center for rapid DNA-based tests in Québec City.

Although the rapid DNA-based tests are an improvement over culture based methods, they still require expensive instrumentation and hospital laboratories. Dr. Bergeron is continuing his research in rapid molecular diagnostics and explained that his team is currently developing a simple CD that "reads DNA instead of music" and which will allow rapid (<1h) point-of-care testing that can easily be performed in doctors' office. Dr. Bergeron envisions that "one day some of these tests might be used by the patients themselves for self-diagnosis in the same way that glucose tests are now used by diabetic patients."

Meetings and Events

The following meetings may be of interest to the III community:

- AIDS Vaccine 2008, October 13-16, 2008, in Cape Town, South Africa (http://www.hivvaccineenterprise.org/conference/2008/)
- Canadian Pandemic Preparedness Meeting: From Discovery to Frontlines, November 6-8, 2008, Winnipeg, Manitoba (http://www.cihr-irsc.gc.ca/e/36338.html)
- Ontario HIV Treatment Network Research Conference 2008, November 13-14, 2008, Toronto, Ontario (http://www.ohtn.on.ca/)
- 8th Canadian Immunization Conference, November 30 - December 3, 2008, Toronto, Ontario (http://www.phac-aspc.gc.ca/cnic-ccni/2008/about-sujet-eng.php)
- Canadian Society for Immunology – Annual Meeting April 3-6, 2009 at the TELUS Whistler Conference Centre, Whistler, BC http://www.csi-sci.ca/scientificmeeting/meeting-welcome09.aspx
- III New Investigators Forum, April 17-19, 2009 at the Kingbridge Conference Centre, King City, Ontario (contact Bruce Moor at bmoor@uwo.ca for more information)
- 26th International Congress of Chemotherapy and Infection "The Changing Climate of Infectious Diseases" Incorporating the AMMI Canada - CACMID Annual Conference 2009. June 18 - 21, 2009, Toronto, Ontario (http://www.ammi.ca/annual_conference/index.php)
- 142nd Canadian Medical Association Annual Meeting, August 16-19, 2009, Saskatoon, Saskatchewan http://www.cma.ca/index.cfm/ci_id/19684/la_id/1.htm

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